ABSTRACT OF THE DISCLOSURE

In a method for manufacturing a semiconductor device and devices formed thereby, a semiconductor material layer (e.g., amorphous silicon or microcrystallized silicon film) is formed on a substrate. At least a region of the semiconductor material layer is irradiated with a laser for heating and melting the semiconductor material in the region. The manufacturing method is controlled to promote uniform cooling of the semiconductor material in the irradiated region. Uniform cooling of the semiconductor material after irradiation is promoted so that, after irradiation, a desirable polycrystalline microstructure is formed in the semiconductor material layer by lateral solidification from a boundary of the region.